

# Reporting of Congenital Malformations on Birth Certificates

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ONE CONCERN of the epidemiologist who uses information from birth certificates to study congenital malformations is that he does not know how to estimate the underreporting inherent in these data. In a previous study (1) we attempted to determine which factors might influence the reporting of malformations on birth certificates, and we demonstrated that completeness of reporting was related to severity and ease of recognition of individual malformations and was apparently not biased by variables descriptive of infants or their parents. There was also an indication that birth certificates prepared in some hospitals were more complete with regard to congenital malformations than were those from other hospitals.

In this report, we explore the possibility of relationships between selected characteristics of hospitals and completeness of malformation reporting on birth certificates.

## Materials and Methods

Obstetric and pediatric records for 57,909 babies in 144 hospitals, or 98.8 percent of all live births in Iowa in 1963, were reviewed. Although

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no attempt was made to study the completeness of these records, other considerations pertaining to their quality were discussed in our earlier report (1). All diagnoses of congenital malformations in the hospital records and similar data in the corresponding birth certificates were abstracted. From published listings in the American Hospital Association's journal (2), personal correspondence with hospital administrators, and from the persons who reviewed and abstracted the records, information was obtained on certain characteristics of each hospital that we believed might influence how well malformations were recorded on birth certificates.

These characteristics included number of births, ownership of the hospital, the size of the city in which it was located, the presence of a medical records librarian, type of staff members who completed the congenital malformation entry on the birth certificates, accreditation of the hospital, and the presence of certain diagnostic or other facilities. The proportions of malformations of major and minor severity described in hospital records of newborns that were also reported on their birth certificates were used as the measure of completeness of reporting.

Because in earlier studies we had discovered that severity of malformations influenced reporting on birth certificates, major and minor defects were treated separately in subsequent analyses. The basis for assigning malformations to categor-

ies of major or minor severity and the individual anomalies contained within each of these categories appear in a 1970 report (3).

Two small hospitals which recorded no malformations and a third which had an atypical pattern of reporting were excluded from the tabulations. The hospital with the atypical pattern of reporting had the largest number of deliveries in 1963—2,180 births. Records in this hospital indicated that the infants were given comprehensive examinations and that diagnostic practices were conservative. Many diagnoses of congenital malformations were qualified by terms such as “borderline,” “slight,” or “indicative of.” So many anomalies were mentioned in this hospital’s records and so few were transferred to the birth certificates in comparison with other hospitals that we decided to omit its records from the analyses of the characteristics to be considered.

## Results

Overall reporting on birth certificates of major and minor malformations recorded in the 141 hospitals studied was 22 percent. The six osteopathic hospitals in the group reported 41 percent of major malformations, whereas the 135 medical

**Table 1. Percentage of malformations reported on birth certificates, according to size of hospital**

Size of hospital (number of live births)	Number of hospitals	Percentage reported	
		Major	Minor
1-199.....	50	74.3	25.7
200-499.....	60	50.7	14.2
500 or more.....	31	38.4	8.8
Total.....	141	44.8	11.5

**Table 2. Percentage of malformations reported on birth certificates, according to size of city**

City population <sup>1</sup>	Number of hospitals	Percentage reported	
		Major	Minor
Less than 2,500.....	29	83.7	30.7
2,500-4,999.....	34	55.7	14.7
5,000-7,499.....	20	58.4	17.0
7,500-9,999.....	11	61.8	27.7
10,000-24,999.....	10	43.2	12.9
25,000-49,999.....	12	36.0	5.6
50,000-99,999.....	18	35.4	6.7
100,000 or more.....	7	46.7	16.6
Total.....	141	44.8	11.5

<sup>1</sup> SOURCE: 1960 census population figures.

**Table 3. Percentage of malformations reported on birth certificates, according to type of hospital ownership**

Type of ownership	Number of hospitals	Percentage reported	
		Major	Minor
Proprietary.....	9	73.7	16.7
County.....	34	56.5	18.7
City or district.....	24	43.5	14.6
Other nonprofit (excluding church).....	35	42.4	11.6
Church.....	39	41.3	8.6
Total.....	141	44.8	11.5

**Table 4. Percentage of malformations reported on birth certificates, by size of hospital and hospital ownership**

Hospital ownership	Hospital size (number of births)			Total malfor- mations
	1-199	200- 499	500 or more	
Proprietary:				
Major malformations...	66.7	76.9	0	73.7
Minor malformations..	25.0	10.0	0	16.7
County:				
Major malformations...	73.3	65.2	40.0	56.5
Minor malformations..	22.9	18.5	17.2	18.7
City or district:				
Major malformations...	77.3	44.7	18.2	43.5
Minor malformations..	21.4	17.5	8.2	14.6
Church:				
Major malformations...	100.0	45.2	40.0	41.3
Minor malformations..	54.5	10.2	7.6	8.6
Other nonprofit:				
Major malformations...	69.2	44.7	37.8	42.4
Minor malformations..	17.4	14.3	8.4	11.6
All:				
Major malformations...	74.3	50.7	38.4	44.8
Minor malformations..	25.7	14.2	8.8	11.5

hospitals reported 45 percent. The proportion of minor malformations reported on birth certificates was slightly higher in osteopathic hospitals (17 percent) than in medical hospitals (11 percent).

As shown in table 1, reporting of congenital malformations on birth certificates was more complete in hospitals with relatively few births. In hospitals with 500 or more births in 1963, the proportion of major malformations reported on birth certificates dropped below 50 percent.

Reporting of congenital malformations according to size of city is shown in table 2. More complete reporting generally occurred in hospitals in cities having fewer than 10,000 inhabitants. However, the seven hospitals in the only city of more than 100,000 inhabitants (Des Moines) had a higher proportion of reporting than hospitals in

cities with populations between 10,000 and 99,999.

We conjectured that hospital administrative procedures might vary according to type of ownership and that these differences could influence the thoroughness with which birth certificates were completed. The percentages of reported malformations according to type of hospital ownership are shown in table 3. The highest proportions of reporting occurred in proprietary and county hospitals. Type of hospital ownership was then examined by size of hospital. In table 4 we see that the annual number of births has a strong influence on the reporting of malformations among all types of hospital ownership.

On the premise that employment of a medical records librarian could be instrumental in determining the quality of a hospital's recordkeeping system, this factor was investigated. In 76 hospitals, a medical records librarian was employed full time. As shown in table 5, reporting in hospitals without the services of a full-time medical records librarian was more complete than in those with a full-time librarian. In general, hospitals that had the smallest number of births annually were less likely to employ a full-time medical records librarian than hospitals with moderate or large numbers of births. Again, hospital size could have been a relevant factor, and the data in table 6 show that

**Table 5. Percentage of malformations reported on birth certificates, according to medical records librarian's employment status**

Employment status	Number of hospitals	Percentage reported	
		Major	Minor
Full time.....	76	42.2	10.3
Part time.....	11	51.1	19.7
None.....	54	53.2	16.1
Total.....	141	44.8	11.5

**Table 6. Percentage of malformations reported on birth certificates, by size of hospitals and employment of medical records librarian**

Size of hospital (number of births)	Full time		Part time		None		All	
	Major	Minor	Major	Minor	Major	Minor	Major	Minor
1-199.....	60.0	17.9	41.7	26.9	84.6	25.3	74.3	25.7
200-499.....	49.8	13.9	71.4	11.5	49.3	16.1	50.7	14.2
500 or more.....	38.7	8.8	42.1	20.8	35.9	6.5	38.4	8.8
Total.....	42.2	10.3	51.1	19.7	53.2	16.1	44.8	11.5

**Table 7. Percentage of malformations reported on birth certificates, according to selected hospital facilities and approvals**

Facility or approval	Number of hospitals	Percentage reported	
		Major	Minor
<b>Facility:</b>			
Obstetrical delivery room.....	140	45.0	11.5
Diagnostic X-ray.....	110	43.4	10.6
Premature nursery.....	64	42.8	10.7
Pathology laboratory..	43	38.3	8.7
<b>Approvals:</b>			
Accreditation.....	65	40.7	9.7
Internship.....	6	39.5	10.0
Nursing school.....	19	39.1	8.4
Residency.....	5	38.1	11.3

NOTE: The categories are not mutually exclusive.

this was true for the employment of full-time medical records librarians, but not for the employment of a part-time librarian.

The annual guide issue of the American Hospital Association (AHA) was used to identify those hospitals having the facilities or approvals listed in table 7 (2). Administrators of hospitals not listed in the guide were queried directly concerning the presence of a nursery for premature infants and an obstetrical delivery room and as to whether or not the hospital was accredited by the Joint Commission on Accreditation of Hospitals. The information listed in table 7 shows there is little relationship between the listed facilities or approvals and the reporting of malformations on birth certificates.

Although the attending physician has ultimate responsibility for the information appearing on a birth certificate, he can delegate this responsibility to other staff members of the hospital. In response to our query regarding who actually completed the entry of congenital malformations on birth certificates, the hospital administrators provided the in-

**Table 8. Percentage of malformations reported on birth certificates, according to position of staff member who made congenital malformation entry**

Staff member	Number of hospitals	Percentage reported	
		Major	Minor
Obstetrician or other physician.....	116	49.2	14.2
Pediatrician.....	15	40.9	11.9
Nurse.....	18	49.6	10.0
Medical records librarian or medical records clerk.....	15	32.4	6.5
Office or ward clerk.....	2	24.3	5.9

NOTE: These are not mutually exclusive categories.

formation in table 8. Hospitals in which the attending physician or a nurse recorded the malformations on birth certificates had better reporting than hospitals in which other staff members completed the entry. No category of staff member reported more than half of the major malformations noted in hospital records.

### Discussion

Inconsistencies in reporting malformations have been studied from many viewpoints, but only a few investigators have directed their attention to the characteristics of hospitals that may influence reporting. Erhardt and Nelson (4) noted that in New York City there was better reporting of congenital malformations in voluntary and proprietary hospitals than in municipal hospitals. In San Francisco, Montgomery and co-workers (5) observed that many persons on the staff other than the attending physician recorded information on birth certificates.

In this study, only three features of the participating hospitals suggest an association with more complete reporting on birth certificates: few annual births, location in a small city, and no full-time medical records librarian. These variables are not independent. The relationships between size of hospital and both type of hospital ownership and employment of medical records librarians were noted previously. In Iowa the number of births and the size of the cities in which the hospitals are located are also closely related. Most of the hospitals in this study recorded fewer than 500 births each and were in cities of less than 10,000 residents.

One reason for the greater underreporting of

congenital anomalies in certain hospitals, especially those having many births, may be that a large proportion of diagnoses were tentative, reflecting borderline cases, which physicians might be less likely to enter on birth certificates than confirmed diagnoses. The large hospital that was omitted from this report appeared to exemplify this tendency. To follow this reasoning, the rates of major and minor malformations were computed from data abstracted from the records of each of the hospitals.

These rates, summarized according to hospital size and city size, are shown in table 9. This table shows that reporting of major and minor malformations tended to increase when the numbers of births and the size of the cities increased. Utilization of large hospitals for teaching purposes and the presence of more highly specialized staff may in part account for the relatively greater number of diagnosed malformations in the records of large hospitals. It appears that physicians in small hospitals document few defects, and those malformations are generally well reported. Noncomparability of hospital records is a hindrance to the comparisons attempted in the study.

Before we started this analysis, we had learned something about differences in the reporting of malformations on birth certificates. Individual malformations are reported in a fairly direct rela-

**Table 9. Rate of congenital malformations entered in hospital records, according to size of city and number of live births occurring in the hospital**

Population and births	Malformation rate <sup>1</sup>	
	Major	Minor
City population:		
Less than 2,500.....	1.2	2.5
2,500- 4,999.....	1.1	2.1
5,000- 7,499.....	1.4	2.5
7,500- 9,999.....	1.2	2.5
10,000-24,999.....	1.5	2.5
25,000-49,999.....	2.3	5.6
50,000-99,999.....	2.2	3.7
100,000 or more.....	2.2	4.9
Number of live births:		
1- 99.....	1.5	2.1
100- 199.....	1.1	2.4
200- 299.....	1.4	2.5
300- 399.....	1.4	3.2
400- 499.....	2.0	3.7
500- 999.....	2.0	3.9
1,000-1,499.....	2.0	3.9
1,500-1,999.....	2.1	6.4
2,000 or more.....	2.2	5.5

<sup>1</sup> Rate based on 100 live births.

tionship to their severity and ease of recognition. The strength of these two factors suggests that in reporting malformations on birth certificates the judgment of the physician is paramount.

#### REFERENCES

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**MACKEPRANG, MURIEL (Public Health Service), and HAY, SYLVIA: *Reporting of congenital malformations on birth certificates. Health Services Reports, Vol. 87, November 1972, pp. 830-834.***

In an attempt to identify factors that may be associated with the completeness of reporting congenital malformations on birth certificates, selected characteristics of 141 hospitals in Iowa in 1963 were examined. Major

and minor malformations were considered separately. Annual number of births, type of hospital ownership, size of city, the presence of a medical records librarian, type of staff member who completed the congenital malfor-

mation entry on the birth certificates, and accreditation and facilities of the hospitals were the variables studied. More complete reporting was associated with few annual births and location in a small city.